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NATIONAL ENERGY BOARD REASONS FOR DECISION

In the Matter of an Application under
the National Energy Board Act
of

Hydro - Québec

August 1980

ABBREVIATIONS USED IN THE REPORT

RELATIVE AND APPEARANCES

THE APPLICATION

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Citizens Utility Gas Company

NATIONAL ENERGY BOARD

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In the Matter of an Application Under the National Energy Board Act

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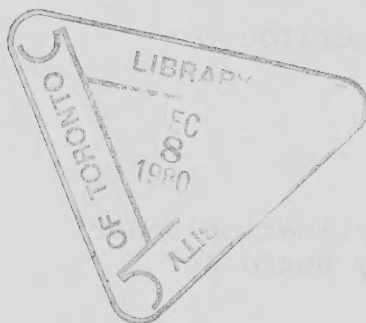
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ABBREVIATIONS USED IN THE REPORTFor Units of Measurement

| | | |
|------|---|--------------------------------|
| kV | : | kilovolt |
| kW.h | : | kilowatt hour |
| GW.h | : | gigawatt hour (1 000 000 kW.h) |
| MW | : | megawatt |
| MW.h | : | megawatt hour (1 000 kW.h) |

For Names

| | | |
|--------------------|---|--|
| Applicant | : | Hydro-Québec |
| Board | : | National Energy Board |
| Citizens Utilities | : | Citizens Utilities Company |
| CVPSC | : | Central Vermont Public Service Corporation |
| GMP | : | Green Mountain Power Corporation |
| NBEPSC | : | The New Brunswick Electric Power Commission |
| NEPOOL | : | New England Power Pool |
| PASNY | : | The Power Authority of the State of New York |
| St. Lawrence Power | : | St. Lawrence Power Company |
| Union/Butterfield | : | Union/Butterfield Division of Litton Industrial Products, Inc. |
| U.S. | : | United States of America |
| Vermont Coop | : | Vermont Electric Cooperative, Inc. |
| VPSB | : | Vermont Public Service Board |

NATIONAL ENERGY BOARD

IN THE MATTER of an application by Hydro-Québec for:

A licence under Part VI of the National Energy Board Act to export power and energy.

(File 1923-4/Q2-7)

HEARD at Montreal, Quebec on 26 June 1980.

BEFORE:

| | |
|-------------|------------------|
| J.L. Trudel | Presiding Member |
| R.F. Brooks | Member |
| R.B. Horner | Member |

APPEARANCES:

| | |
|-------------------|-----------------------|
| Nicole Lemieux) | Hydro-Québec |
| Robert Driscoll) | Ontario Hydro |
| Ann Bigué) | National Energy Board |

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THE APPLICATION

The application by Hydro-Québec, dated 28 September 1979, is for a licence to authorize exports of electric power and energy to two customers in the State of Vermont. One is Vermont Public Service Board which would purchase up to 52 megawatts of power and 320 gigawatt hours of energy per year over the five-year period from 1 October 1980 to 30 September 1985. The other is Citizens Utilities Company which would purchase up to 80 MW of power and 525 GW.h of energy per year over the five-year period from 1 January 1981 to 31 December 1985.

The terms of the proposed exports are described under the heading "THE EXPORT CONTRACTS".

BACKGROUND

The Applicant, Hydro-Québec, was established in 1944 by a special act of the legislature of the Province of Quebec. The Applicant now operates under the authority of the Hydro-Québec Act, L.R.Q. C.H-5, as amended.

Hydro-Québec owns and operates an electric power system that extends throughout most of the settled areas of the Province of Quebec. Appendix 1 is a map showing the major generating stations and 735 kV bulk power transmission facilities. The map also shows Hydro-Québec's interconnections with systems outside the province.

None of Hydro-Québec's interconnections with neighbouring power systems is synchronous. There are some dozen transmission lines crossing the Ontario-Quebec border, but they are used to connect electrically isolated portions of the Quebec system to the Ontario system. Between Quebec and New Brunswick there is an asynchronous direct-current tie, with a rated capacity of 320 megawatts, and an additional 130 MW of New Brunswick load can be supplied radially from the Hydro-Québec system. The transmission lines from Labrador connect the Churchill Falls plant to the Quebec system.

There is likewise no synchronous interconnection between Hydro-Québec and any major system in the United States. There are a number of international power lines from Quebec, but in every case exports are made either by isolating generation in Quebec and operating it synchronously with U.S. systems, or by isolating sections of the U.S. service area and operating it synchronously with Hydro-Québec.

The present application is for a licence to authorize exports to two customers in the State of Vermont, namely Vermont Public Service Board and Citizens Utilities Company.

Vermont Public Service Board is a state regulatory agency which is also involved in the overall planning of utility service within the state. The proposed export from Hydro-Québec would be purchased by VPSB and resold on a nonprofit basis to utilities in the state. The power would be generated by isolated units at Beauharnois generating station and exported from Quebec over the Applicant's 765 kV interconnection with The Power Authority of the State of New York (PASNY). The interconnection is authorized by Certificate of Public Convenience and Necessity EC-III-15. Exports would be wheeled from PASNY's Massena substation through various circuits in northern New York to Vermont.

The other customer, Citizens Utilities Company, serves an area in northern Vermont adjacent to the international boundary. Exports have been made from Quebec to this region continuously since 1912. At present, exports are made under Licences EL-106, EL-107 and Order ELO-131 to three customers in the area. Respectively, these are: Vermont Electric Cooperative Incorporated, Citizens Utilities, and Union/Butterfield Division of Litton Industrial Products Incorporated. All three authorizations will expire on 31 December 1980. Vermont Electric Coop and Union/Butterfield have notified Hydro-Québec that they intend to seek future supplies of electricity within the U.S. and will, therefore, cease to be export customers at the end of 1980. In its present application Hydro-Québec seeks to continue exports to Citizens Utilities. The proposed export would be generated within Hydro-Québec's system and would be transmitted to Citizens Utilities over the Applicant's 120 kV international power line originating at Stanstead, Quebec. The line is certificated under EC-III-17. Citizens Utilities would isolate the portion of its system being supplied by the export and operate it synchronously with Hydro-Québec.

The Applicant also requested that authorization be granted to carry exports to Citizens Utilities over four 25 kV international power lines located in the same general area. The lines are covered by Certificates EC-7, EC-8, EC-42, and EC-43. The first three lines are currently used to supply Vermont Coop and the last is used to supply Union/Butterfield.

THE EXPORT CONTRACTS

Vermont Public Service Board

Under the Power and Energy Contract between Vermont Public Service Board and Hydro-Québec dated 26 June 1979, Hydro-Québec would make available to Vermont Public Service Board a maximum of 52 MW and 320 GW.h per year of "hydraulic power and energy" for five years starting 1 October 1980. The minimum annual export is set at 200 GW.h but this would be reduced in the event of exceptionally low flow in the St. Lawrence River at Beauharnois generating station, or because of electrical problems on the 120 kV circuits between Beauharnois and Chateaugay substation. The contract also provides that VPSB shall take or pay for amounts of energy starting at 25 GW.h in the first and second contract years⁽¹⁾ increasing thereafter by 5 GW.h per year.

Actual exports would be scheduled on a daily, weekly or longer basis. The contract states that once a schedule has been established, exports would be considered firm but nevertheless could be reduced or interrupted to:

- (a) supply the primary and interruptible loads on Hydro-Québec's system,
- (b) supply firm contracts or capacity transactions with neighboring systems,

(1) Contract year is 1 October to 30 September of the following year.

- (c) maintain adequate spinning reserve and transmission security on any part of the Hydro-Québec's system,
- (d) continue to supply the secondary energy loads within the Hydro-Québec's system provided such loads were committed or connected to the system and taking deliveries of power at the time the delivery schedule was agreed upon, or,
- (e) avoid the necessity of using fossil-fired generation to supply the primary and interruptible loads on Hydro-Québec's system.

The export price would include a capacity charge which, for the first contract year, is fixed at the lesser of \$600 (U.S.) per MW per week or \$120 (U.S.) per MW per day. The capacity charge for succeeding contract years would be negotiated during the preceding August.

The energy price during any of the first six months of the contract would be the lesser of \$23 (U.S.) per MW.h or an amount determined by the formula:

$$V_E = C_E - \left[\frac{V_c - C_c}{168 \times 0.7} \right] \quad \text{for weekly transactions, or}$$

$$V_E = C_E - \left[\frac{V_{cd} - C_{cd}}{24 \times 0.7} \right] \quad \text{for daily transactions, where}$$

V_E = energy charge to VPSB in \$(U.S.)/MW.h

V_C = capacity charge to VPSB in \$(U.S.)/MW/week
(\$600/MW/week for first 12 months)

V_{cd} = capacity charge to VPSB in \$(U.S.)/MW/day
(\$120/MW/day for first 12 months)

C_E = energy charge associated with Short Term or
Capacity Power transactions with Canadian
utilities in \$/MW.h⁽¹⁾

C_C = Canadian capacity charge for Short Term
Power in \$/MW/week⁽¹⁾ (currently
\$450/MW/week)

C_{cd} = Canadian capacity charge for Capacity Power
in \$/MW/day⁽¹⁾ (currently \$90/MW/day).

The Canadian charges used in the formulae are from the Applicant's interconnection agreements of 1 February 1979 with Ontario Hydro and 26 July 1979 with The New Brunswick Electric Power Commission.

After the first six months the energy price would be renegotiated every six months. Negotiations would take place in August for the succeeding six months starting 1 October and in February for the succeeding six months

(1) The Canadian charges would be converted to United States Funds using the rate of exchange quoted by the Bank of Canada in effect at noon on the last business day of the monthly period covered by the bill.

starting 1 April. The price would be set by a Joint Committee taking into account the energy's market value and would not be less than the lowest price in effect during the first six months of the contract.

Citizens Utilities Company

Under the Power and Energy Agreement between Citizens Utilities and Hydro-Québec dated 26 June 1980, Hydro-Québec would make the maximum amounts of "firm electrical power and energy" set out below available to Citizens Utilities during the seven-month period 1 April through 31 October of each year 1981 through 1985. Citizens Utilities would take or pay for the minimum amounts.

| <u>Year</u> | <u>Minimum</u> | | <u>Maximum</u> | |
|-------------|------------------|---------------------|------------------|---------------------|
| | <u>Power(MW)</u> | <u>Energy(GW.h)</u> | <u>Power(MW)</u> | <u>Energy(GW.h)</u> |
| 1981 | 10 | 25.6 | 32 | 131.4 |
| 1982 | 11 | 28.2 | 37 | 152.0 |
| 1983 | 12 | 30.8 | 39 | 160.2 |
| 1984 | 13 | 33.3 | 42 | 172.5 |
| 1985 | 15 | 38.5 | 46 | 189.0 |

In addition, the contract also provides for sales of "assured secondary energy" such that the total rate of export would not exceed 80 MW and the total quantity of energy would not exceed 525 GW.h in any year of the contract.

Deliveries of firm power would not be subject to interruption by Hydro-Québec except to avoid starting fossil-fired generation and to avoid purchasing power from a third party. Deliveries of assured secondary energy would be scheduled, and could be interrupted, in the same circumstances as those outlined earlier for the proposed export to Vermont Public Service Board.

The export price for firm power would include a capacity charge, fixed at \$600 (U.S.) per MW per week for the first two summer seasons, and negotiable eighteen months in advance for subsequent seasons. The price for firm energy in any year would be determined by multiplying \$21 (U.S.) per MW.h by the ratio determined by dividing the average unit cost of total deliveries to the New England Power Pool (NEPOOL) during the preceding calendar year by the average unit cost of total deliveries to NEPOOL during the twelve-month period which commenced 1 July 1979.

$$\text{i.e. Export price in year (n)} = 21 \times \frac{\text{average NEPOOL cost in year (n-1)}}{\text{average NEPOOL cost in 12 months after 1 July 1979}}$$

In no case would the energy price be less than \$21 (U.S.) per MW.h

The price for assured secondary energy would be established by a Joint Committee prior to 1 January 1981 and subsequently renegotiated as often as necessary to follow the market value of interruptible energy.

THE EVIDENCE: EXPORT OF POWER AND ENERGY

The Quebec Load

According to the Hydro-Québec's Annual Report, the Applicant was serving over two million customers at the end of 1979. Of these, 2 036 302 were classified as residential, 243 587 as commercial, 71 639 as residential-farm and 11 257 as industrial. The industrial category includes a number of primary industries such as mining and pulp and paper as well as a number of secondary manufacturing industries. Over the 1974 to 1979 period, the total number of customers has increased by about 2.6 per cent annually. The peak load on the system in December 1979 was 17 582 MW. The total energy sales in 1979 reached 97 015 GW.h.

Generating Capacity and Additions

In 1979, the generated and purchased capacity available to the Hydro-Québec system was approximately 19 700 MW. Including the first four units of LG 2 which have been in service since October 1979, the total hydraulic generating capacity amounts to some 13 500 MW. The thermal capacity is almost 1000 MW. Appendix 2 shows the capacity of the Applicant's generating stations. In addition, Hydro-Québec purchases approximately 5200 MW of which by far the greatest part is from Churchill Falls, Labrador. To supply the anticipated load growth in Quebec, the Applicant is developing

Gentilly 2, a nuclear generating station, and large hydroelectric sites along the La Grande and the Manicouagan-Outardes river systems. By 1985 the total supply capacity is scheduled to be approximately 30 000 MW.

Surplus Capacity and Energy

The application includes forecasts of the power and energy requirements of the Hydro-Québec system for each month throughout the requested licence period. It should be noted that the Abitibi system is now interconnected with the main system. Cross-examination showed that during the period of the proposed export Hydro-Québec is expecting an average annual growth rate of more than 7 per cent for its total internal demand. The residential sector demand is expected to grow at approximately 11 per cent per annum, mainly due to the increased number of homes using electric heating.

The Applicant's estimates of generating capacity, demand and required reserve for the months of January and October for each year of the proposed export are shown in Appendix 3. The figures for generating capacity are representative of normal operating conditions and average stream flows. Examination of the monthly tables supplied with the application, from which Appendix 3 is derived, shows that

Hydro-Québec expects its annual peak load during January. October is shown because, during the seven-month summer period in which firm exports are proposed, it is the month in which the highest loads and the smallest surpluses occur. The monthly tables show that while there will generally be little or no surplus capacity available during the winter months (December to February) throughout the proposed export period, there will be substantial amounts of surplus at other times.

Estimates of Hydro-Québec's annual energy capability, load and surplus are summarized in Appendix 4. The estimates are based on average stream flows and normal operating conditions and take into account the inter-seasonal and multi-annual regulation characteristics of the reservoirs. The firm load includes 3000 GW.h already authorized for export to PASNY during the summers of 1980 and 1981. Examination of the appendix shows annual energy surpluses ranging from 5801 GW.h in 1980 to 11 197 GW.h in 1983.

Export Markets

Vermont Public Service Board is the state agency which regulates public utilities operating within Vermont. The application states that the two largest electric distribution utilities in Vermont have agreed to be responsible for the take or pay requirement in the contract. Central Vermont Public

Service Corporation (CVPSC) has guaranteed 60 per cent and Green Mountain Power Corporation (GMP) 40 per cent. The power and energy would be offered to all of the electric distribution companies in Vermont. In 1978, CVPSC and GMP supplied about 72 per cent of the electricity consumed in Vermont.

Citizens Utilities' service area in northern Vermont is relatively small and underdeveloped. The economic activity is mainly agricultural with a small industrial sector and a developing tourist industry. Citizens Utilities owns only small generating facilities in Vermont and has no plans for expansion. The bulk of its load is supplied through energy purchased from Hydro-Québec and U.S. utilities. A witness testified that the company is not currently negotiating any new contracts to purchase electric power in the U.S.

Offers to Canadian Utilities

The Applicant sent letters dated 24 April 1980 to St. Lawrence Power Company, Ontario Hydro and The New Brunswick Electric Power Commission enclosing copies of the application and requesting the recipients to indicate in writing that their companies were not interested in purchasing the power and energy proposed for export.

By a letter dated 16 May 1980, St. Lawrence Power

Company replied that the two contracts would not provide an economic source of energy to meet its requirements since the deficiency on its system occurs during the winter period when there is no power surplus on the Hydro-Québec system. However, future load increases and economic changes could lead to a power requirement from a Canadian source on an annual basis, possibly within the period of the requested licence. The letter stated that St. Lawrence did not oppose the issuance of an export licence provided that it be conditioned to require that priority be given to Canadian loads.

Ontario Hydro replied by letter dated 26 May 1980 that at that time it did not see a need for the firm power and energy. Also, it had no objection to the proposed export of hydraulic power and energy to Vermont Public Service Board or to the export of assured secondary energy to Citizens Utilities on an interruptible basis provided that any licences which were issued be conditioned to require that priority be given to Canadian loads.

By a letter of 21 May 1980, The New Brunswick Electric Power Commission replied that it had no objection to Hydro-Québec's application.

Export Price

The prices for the proposed exports are outlined under the heading "THE EXPORT CONTRACTS". A witness for the Applicant testified that Hydro-Québec wished to maximize its revenue by selling its energy surpluses in the export market while satisfying the three tests used by the Board in assessing export prices. The tests are

- (i) that the export price should recover its appropriate share of the costs incurred in Canada,
- (ii) that it should not be less than the price to Canadians for equivalent service in related areas, and
- (iii) that it should not result in prices in the country to which the power is exported being materially less than the least-cost alternative for power and energy at the same location within that country.

In relation to the first test, the Applicant stated that no new generating or transmission facilities would be needed to make the proposed export. Under cross-examination, a witness testified that no cost would be incurred in Canada other than the marginal cost of generating the energy for export which, for Hydro-Québec's hydroelectric installations, varies between 0.5 and 1 mill per kW.h.

Firm Power and Energy to Citizens Utilities

In respect of the second test, the Applicant pointed out that firm sales to Citizens Utilities would be made only from April through October and took the position that there is no equivalent service whereby Canadians purchase firm power only during the seven-month summer period.

The evidence regarding the third test provided by Citizens Utilities states that the least-cost source available to replace the proposed exports of firm power and energy would be the Vermont Yankee Nuclear Unit. For the year 1981, the total cost from this alternative source at the Citizens Utilities load centre would be \$22.90 (U.S.) per MW.h compared to \$27.50 (U.S.)⁽¹⁾ per MW.h for the export. The export is expected to continue to be more expensive throughout the proposed licence term. Cross-examination showed that Citizens Utilities is willing to pay a higher price for the proposed export because it would be in the form of a firm power purchase from a system, not from a single unit. The utility feels that the reliability and the continuity of service inherent in a purchase from a system as compared to a unit purchase is well worth the difference in cost.

Hydraulic Power and Energy to VPSB

Regarding the second test, a witness for the Applicant stated that since the sales to Vermont Public Service

(1) Based on \$600 (U.S.) per megawatt per week plus \$21.00 (U.S.) per megawatt hour at 75 per cent load factor.

Board would be interruptible, they should be compared with sales of fuel replacement energy made to The New Brunswick Electric Power Commission and to Ontario Hydro.⁽¹⁾ He claimed that the proposed export was in fact a sale of a fuel replacement energy with an additional charge for capacity. The testimony indicates that Vermont Public Service Board would purchase the export to realize savings in energy costs, not to fulfil its capacity requirements. The application estimates that the highest Canadian price for fuel replacement energy between 1 October 1980 and 31 March 1981 will be \$25 per MW.h. The average composite price for the export to Vermont Public Service Board would be \$31.10 (U.S.)⁽²⁾ per megawatt hour delivered to the Vermont border, including \$3 (U.S.) per megawatt hour for wheeling by PASNY.

Regarding the Board's third test, the witness from Vermont Public Service Board testified that the capacity component of the proposed purchase would be of little value since the utilities in Vermont have sufficient capacity to meet their load and reserve requirements between 1980 and

(1) Fuel replacement energy is defined in various agreements to which Hydro-Québec is a party as interruptible energy generated from renewable resources to replace energy which would otherwise be generated from non-renewable resources. It is normally priced at 80 per cent of the cost of the displaced non-renewable energy, less delivery charges.

(2) Based on \$600 (U.S.) per megawatt per week plus \$23.00 (U.S.) per megawatt hour at 70 per cent load factor.

1985. He said that the export energy would be useful during high-load periods to avoid using oil-fired generation, thereby creating savings. Contracts for the oil-fired sources are already in existence and the associated capacity charges will have to be paid whether the export occurs or not. His position was that the alternative available to Vermont Public Service Board is purchases of economy energy.⁽¹⁾

The alternate source for economy purchases in Vermont is the New England Power Pool. NEPOOL is a large power pool comprising many utilities in six states using all types of generation. The application states that during six months in 1979 the NEPOOL incremental cost averaged \$31 (U.S.) per MW.h, with a June average of \$36.50 and an October average of \$26.70 (U.S.) per MW.h.

Assured Secondary Energy to Citizens Utilities

The price for assured secondary energy sales to Citizens Utilities has not yet been established. Testimony was given to the effect that it would be an economy purchase for Citizens Utilities and that it was comparable to sales of fuel replacement energy in Canada or economy sales in Vermont. Board Counsel asked the Applicant's witness to quote a minimum price for this type of sale. The witness stated that the fuel

(1) Economy energy is normally defined as interruptible energy generated by one utility (incremental cost) and purchased by a second utility to avoid operating more expensive generation (decremental cost). It is normally priced according to the split-savings formula:
Price = $1/2$ (incremental cost + decremental cost).

replacement price in Canada could be as low as \$10 or \$12 per megawatt hour and as high as \$25 per MW.h. He added that the price for assured secondary energy to Citizens Utilities would always be higher than the minimum price in Canada but he could not quote any exact number. He also stated that the usual fuel replacement cost formula would not be appropriate here since Citizens Utilities does not own any major thermal plant.

The witness testified that from Hydro-Québec's point of view there is no difference in value between assured secondary energy and the energy proposed for export to Vermont Public Service Board. He stated that every time a new price was negotiated for assured secondary energy, the energy would be offered to Canadian utilities at the same price before being exported. The witness explained that the price for assured secondary energy could not be submitted for the Board's prior approval as it is expected to vary frequently and approval from the Board would be needed in a matter of minutes if lost sales were to be avoided.

In respect of the third test, the witness from Citizens Utilities testified that he had not researched the market to discover the alternative costs but he thought that economy energy might be available from plants with incremental costs ranging from \$7 (U.S.) per MW.h for Vermont Yankee to \$18 (U.S.) per MW.h for coal-fired generation.

Environmental Effect

The application states that Hydro-Québec would not have to make any addition to its existing installations in order to effect the export. The proposed exports would be generated from hydraulic sources only, and the Applicant would not operate fossil-fired or nuclear generation for export purposes. The evidence indicates that Hydro-Québec would continue to operate its system within the existing environmental constraints.

INTERVENTIONS

Ontario Hydro was the only intervenor. Its intervention supported Hydro-Québec's application provided the usual Canadian priority clauses were included in any licence which is issued. At the hearing, Ontario Hydro did not lead any evidence, nor did it participate in cross-examination or argument.

DISPOSITION

The Board has given careful consideration to all the evidence and submissions presented.

Export Application

Section 83 of the National Energy Board Act requires the Board, in examining an application for an export licence, to have regard to all considerations that appear to it to be relevant. Without limiting the generality of the foregoing, the Board is required to satisfy itself that the power to be exported is surplus to reasonably foreseeable Canadian requirements and that the price to be charged is just and reasonable in relation to the public interest.

Environmental Effect

Before discussing questions of surplus and price, on the subject of environmental effects, the evidence shows that all the energy proposed for export would be generated from Hydro-Québec's hydraulic resources. The export would not cause the Applicant to operate its system outside the existing environmental constraints.

The evidence shows that for technical reasons it could be necessary for Hydro-Québec to operate thermal generation at the same time as exports were being made, but that thermal generation would never be started solely to supply the exports. The Board is satisfied that the exports from hydraulic sources would create no material environmental effect.

Surplus

In considering surplus, it is convenient to group the three different exports into two categories. The first would include only the firm exports to Citizens Utilities from April through October of each year. The second category would comprise both the hydraulic power and energy under the contract with Vermont Public Service Board and the assured secondary energy under the contract with Citizens Utilities.

Appendix 3 is a summary of the Applicant's capacity, demand and surplus projections for the months of January and October for each year of the proposed export. October is the month during the April to October period in which Hydro-Québec normally has the largest loads and the smallest surpluses. Appendix 3 shows that Hydro-Québec will have surpluses in each October ranging from 393 megawatts in 1980 to 3508 megawatts in 1984. Hydro-Québec should have no difficulty supplying its existing commitments as well as the amounts of firm capacity set out in the contract with Citizens Utilities.

Appendix 4 is a summary of the Applicant's estimates of its annual energy capability, load and surplus for the years 1980 through 1985. Appendix 4 shows a minimum annual surplus of 5801 GW.h in 1980 and larger amounts thereafter. The surpluses are large in relation to the quantities proposed for export. From the foregoing, the proposed firm quantities of power and energy for Citizens Utilities are surplus to Hydro-Québec's needs.

In examining the surplus nature of the proposed quantities in the second category, it is reassuring to note that each contract allows transfers to be reduced or interrupted to provide priority to Hydro-Québec's Canadian commitments. Furthermore, the Applicant's monthly projections of capacity, demand and surplus show that during most months Hydro-Québec will have ample unused generation capacity to supply such exports. In the winter months surplus capacity may not be available and exports would have to be reduced or interrupted.

Appendix 4 shows energy surpluses large enough to supply many times the quantities proposed for export. The Board is satisfied that the hydraulic power and energy proposed for export to Vermont Public Service Board and the assured secondary energy proposed for export to Citizens Utilities are surplus to Hydro-Québec's needs.

Hydro-Québec's letters of 24 April 1980 asked NBEP, Ontario Hydro and St. Lawrence Power to indicate they had no interest in the proposed exports. NBEP replied that it had no objection to the exports. Ontario Hydro replied that it had no interest in the proposed export of firm electrical power and energy to Citizens Utilities and that it had no interest in either of the proposed interruptible exports, provided that any licence for interruptible exports contained the conditions normally included by the Board in interruptible licences. St. Lawrence Power replied that it did not oppose the export application provided that any licence contained the standard interruptible conditions.

A witness testified that Hydro-Québec has no objection to the inclusion of the usual interruptible conditions in any licence which might be issued. He said that this would be particularly true for separate licences authorizing the export of hydraulic power and energy to VPSB and assured secondary energy to Citizens Utilities. He added that it would be preferable that such conditions not be included in a licence for firm exports to Citizens Utilities.

The Board is of the opinion that inclusion of the usual interruptible conditions would be appropriate in licences which may be issued for exports to VPSB and for exports of assured secondary energy to Citizens Utilities. Because the energy proposed for export to VPSB would be used by consumers who are served from the integrated U.S. system, the export could be interrupted at any time with little or no warning without adverse consequences. On the other hand, interruption of the supply to Citizens Utilities would require sufficient warning to allow Citizens Utilities to switch the isolated part of its system to an alternate supply. Testimony showed that the switchover takes up to 20 minutes.

The Board does not agree with the implication in St. Lawrence Power's reply that a licence for firm exports to Citizens Utilities should contain clauses allowing it to be interrupted. St. Lawrence Power did not demonstrate any need or interest in acquiring the power and it would be very much against the Board's normal practice to include provisions allowing unlimited interruptions in a firm licence of the sort being sought here.

The Board notes that none of the neighbouring utilities has shown any interest in purchasing the proposed firm export and is satisfied that it is surplus to the requirements of accessible Canadian markets. As for the interruptible exports, the inclusion of the normal interruptible conditions granting priority to economically accessible Canadian utilities would protect their interests.

From the foregoing, the Board is satisfied that the power and energy proposed for export will be surplus to reasonably foreseeable Canadian requirements.

Export Price

In assessing the suitability of an export price, the Board has developed three tests. Briefly stated, these are that the export price must recover the applicable costs incurred in Canada, that it shall not be less than the cost for equivalent service to Canadian customers, and that it shall not be materially less than the least-cost alternative in the market area.

Regarding the first test, none of the exports would require the construction of any additional facilities in Canada and the incremental cost of generating the exports themselves would be less than one mill per kilowatt hour. The export prices clearly meet the first test.

The price for firm exports to Citizens Utilities would comprise a demand charge and an energy charge. The demand charge is fixed at \$600 (U.S.) per MW per week for the first two seasons and would be negotiable thereafter. For energy, the floor price would be \$21 (U.S.) per MW.h and would escalate as set out in the contract. According to estimates in the evidence the combined price, including delivery costs, would be \$27.50 (U.S.) per MW.h in 1980 rising to \$30.00 (U.S.) per MW.h by 1985.

In respect of the second test, the Applicant took the position that it does not provide service to Canadian customers which is comparable to the firm exports proposed for Citizens Utilities. The Board accepts this argument and, in this case, will not employ the second test.

With respect to the third test, a witness testified that the least-cost alternative to Citizens Utilities would be to purchase firm power and energy under a unit participation agreement with Vermont Yankee Corporation. The total cost under such an agreement was stated to be between \$22.90 and \$25.10 (U.S.) per MW.h, which is less than the proposed export price. A witness from Citizens Utilities stated that his utility was willing to pay more for the power from Hydro-Québec because it would be more reliable than the alternative purchase from the Vermont Yankee nuclear unit. This is reasonable as the overall reliability of Hydro-Québec's system is bound to be higher than that of a single generating unit.

From the foregoing, the Board is satisfied that the price for firm exports to Citizens Utilities will be just and reasonable in relation to the public interest for the first two seasons. Thereafter the demand charge is negotiable, and any licence which is issued would have to include a condition requiring that it be submitted for the Board's approval.

The price for exports to VPSB would also include demand and energy components. The contract fixes the demand charge at the lesser of \$600 (U.S.) per MW per week or \$120 (U.S.) per MW per day for the first contract year. Thereafter it would be renegotiated yearly. For the first six months the energy charge would be based on the formula shown on page 7 of this report but would not be higher than \$23 (U.S.) per MW.h. Thereafter, it would be renegotiated, one month in advance, for each six-month period.

In explaining the operation of the energy price formula, the Applicant estimated that the applicable Canadian energy charge (C_e in the formula) would be \$35.00 per MW.h. Substituting this and other known values in the formula, and using a pessimistic exchange rate of \$0.80 (U.S.) one finds that the VPSB energy price (V_e) would be \$25.96 (U.S.) per MW.h⁽¹⁾. By contractual condition, this would revert

$$(1) \quad V_e = (35 \times .80) - \left[\frac{600 - (450 \times .80)}{168 \times 0.7} \right] = 25.96$$

to the ceiling price of \$23 (U.S.) per MW.h. Thus, it appears likely that the energy price would be \$23 (U.S.) per MW.h for the first six months of the contract.

In respect of the Board's second test, it is the Applicant's position that the proposed export to VPSB is comparable to its sales of fuel replacement energy to other utilities. The evidence shows that Vermont Public Service Board would make the purchase in order to create savings on its system and not to meet its required capacity commitments. Therefore, it is reasonable to assess the export price in relation to the cost of fuel replacement energy.

Hydro-Québec sells fuel replacement energy to neighboring systems at 80 percent of the applicable decremental cost, less delivery charges. Because The New Brunswick Electric Power Commission uses considerable amounts of oil-fired generation, it normally pays more for fuel replacement energy than does any other of Hydro-Québec's Canadian customers. According to the Applicant, the average cost of fuel replacement energy to The New Brunswick Electric Power Commission during 1980-81 will be \$25.00 per megawatt hour.

At 70 per cent load factor, the maximum allowed by the contract, the total export price to Vermont Public Service Board would be \$28.10 (U.S.) per megawatt hour at the

international boundary. It is clear that the export price will meet the Board's second test for the first six months. In order to satisfy itself regarding the export price beyond the first six months, the Board would include a condition in any licence requiring Hydro-Québec to submit for approval the demand charge and the energy price each time they are re-established by the Joint Committee.

The evidence shows that the least-cost alternative to Vermont Public Service Board would be purchases of economy energy in the New England Power Pool and that the recent six-month average incremental cost associated with such purchases was \$31 (U.S.) per MW.h. Thus, the Board concludes that the export price for the first six months will not be materially less than the least-cost alternative in the market area. With the inclusion of the condition discussed earlier, the Board would be able to periodically re-examine the export price in order to ensure it remains just and reasonable in relation to the public interest.

No price has yet been established for exports of assured secondary energy to Citizens Utilities. The testimony shows that the price would be set by taking into account the value of interruptible energy and that it would not be less than the highest cost for fuel replacement energy to any of Hydro-Québec's Canadian customers.

The lack of a floor price or stringent guidelines for setting the price of this particular export makes it difficult for the Board to complete its evaluation. Furthermore, the Applicant stressed its unwillingness to submit the price for the Board's approval when it is negotiated. Witnesses stated that, because the price would change frequently, it would be impossibly cumbersome to seek the Board's approval for each change. The Board is sympathetic to the Applicant's contention that such a requirement might be restrictive. Nevertheless, the Board is obligated to satisfy itself that the price will be just and reasonable, which is difficult to do with the information at hand.

It occurs to the Board that a solution to the problem of evaluating the export price for assured secondary energy would be to require that it be not less than that for the exports to Vermont Public Service Board under the Power and Energy Contract of 26 June 1979. In reaching this solution the Board has taken into account the fact that the two exports are very similar, if not identical. Hydro-Québec has compared each to domestic sales of fuel replacement energy. Each would be supplied from the Applicant's hydraulic resources. Each would be interruptible for identical reasons. In each case the customer is a utility in Vermont which would make the purchases to affect savings, and in each case the alternative is purchases of economy energy from the New England Power Pool.

The costs for purchases of economy energy estimated by the witness from Citizens Utilities are considerably lower than those given by the witness from Vermont Public Service Board. The witness from Citizens Utilities admitted that he had not investigated the matter in detail. His estimates relate to nuclear and coal-fired generation, both of which are markedly less expensive than oil-fired generation. It stands to reason that the local utilities would employ the less expensive generation first. Therefore, if any economy energy is available from such low-cost sources, it will only be at times when local loads are very low. On the other hand, the figures given by the witness from Vermont Public Service Board are calculated averages for economy transactions in NEPOOL and are therefore taken by the Board as being representative of the cost of alternate sources which have a good chance of being available.

From the foregoing, the Board concludes that the price for exports of assured secondary energy will be just and reasonable if any licence which is issued includes a condition requiring the export price to be not less than that for exports to Vermont Public Service Board. Exports to VPSB will terminate on 30 September 1985 whereas exports of assured secondary energy to Citizens Utilities would continue another three months until the end of 1985. The Board is unable to satisfy

itself that the export price would be just and reasonable during the final three-month period of the proposed term and therefore concludes that the term of any licence should end no later than 30 September 1985.

The amount of energy proposed for export under this licence is 525 GW.h per year, less actual exports under the firm licence. For 1985 the figure will have to be reduced to take the reduced term into account. On a pro rata basis the new export quantity would be 393.75 GW.h. ⁽¹⁾ Hence, the Board would limit exports of assured secondary energy in 1985 to 400 GW.h, less the actual exports of firm energy during the same year.

The Board's Finding

From the foregoing, having satisfied itself that the export will have no material environmental effect, that the power and energy to be exported are surplus to reasonably foreseeable Canadian requirements and that the export prices will be just and reasonable in relation to the public interest, the Board is prepared to issue three export licences to Hydro-Québec subject to the conditions discussed earlier in the report.

The first licence is for firm power and energy to Citizens Utilities up to the maximum amounts shown in the contract for five years commencing 1 January 1981. Applicable terms and conditions are set out in Appendix 5. The second

(1) $525 \times .75 = 393.75$

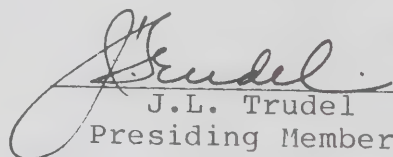
is for up to 52 MW and 320 GW.h per contract year of hydraulic power and energy to Vermont Public Service Board for five years commencing 1 October 1980. Applicable terms and conditions are set out in Appendix 6. The third is for up to 80 MW and 525 GW.h per year of assured secondary energy to Citizens Utilities, less actual firm exports under the first licence above, for four years and nine months commencing 1 January 1981. Applicable terms and conditions are set out in Appendix 7.


Export Facilities

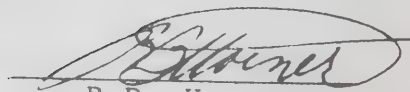
The Applicant requested that the authorizations for exports to Citizens Utilities allow the use of four 25 kV international power lines as well as the 120 kV interconnection between Citizens Utilities and Hydro-Québec. The evidence does not indicate how the 25 kV lines could be used to supply the export to Citizens Utilities. It is not clear if modifications would be required and no agreements for their use have been filed. The Board is not, at this time, prepared to grant this request. If in the future Hydro-Québec wishes to seek approval for use of the additional lines, the Board is prepared to consider an adequately documented application for this purpose.

RECAPITULATION

Having regard to the foregoing considerations, findings and conclusions, and having taken into account all matters that appear to it to be relevant, the Board is prepared to issue three licences to Hydro-Québec upon the terms and conditions set out in Appendices 5, 6 and 7. The first licence is for firm power and energy to Citizens Utilities in the amounts shown in the contract for five years commencing 1 January 1981. The second is for up to 52 MW and 320 GW.h per year of hydraulic power and energy to Vermont Public Service Board for five years commencing 1 October 1980. The third is for up to 80 MW and 525 GW.h per year of assured secondary energy to Citizens Utilities, less actual firm exports under the first licence above, for four years and nine months commencing 1 January 1981. The issuance of the licences is subject to the approval of the Governor in Council.


J.L. Trudel
Presiding Member

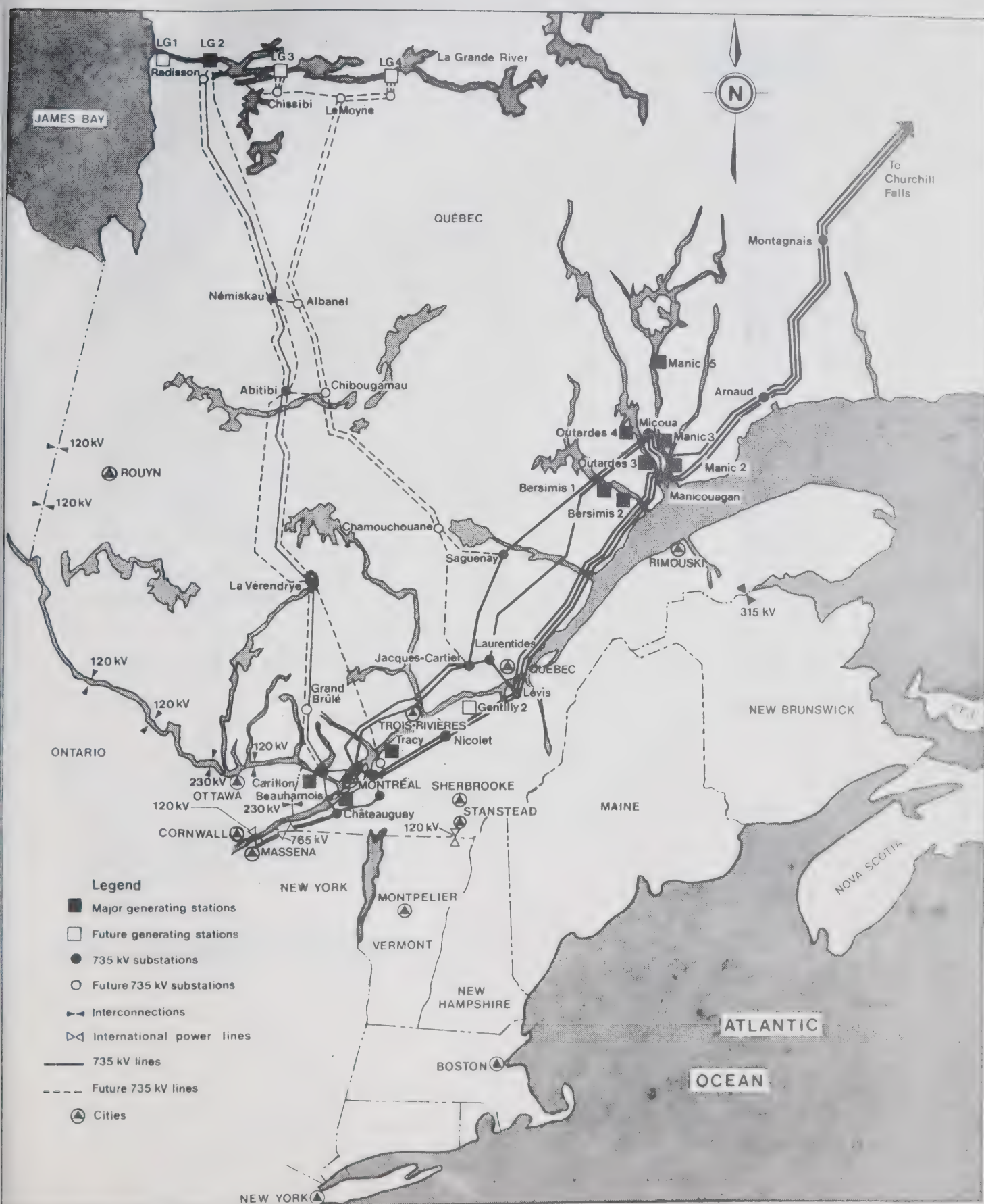

R.F. Brooks
Member


R.B. Horner
Member

Ottawa, Canada
August, 1980.

HYDRO-QUÉBEC

Main generating stations and transmission system



HYDRO-QUEBEC

POWER

CAPACITY, DEMAND AND SURPLUS
(MEGAWATTS)

| | 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | |
|----------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| | October | January | October | January | October | January | October | January | October | January | October | January |
| <u>CAPACITY</u> | | | | | | | | | | | | |
| hydro | 13 065 | 13 309 | 14 730 | 15 307 | 16 779 | 17 215 | 18 123 | 18 751 | 20 164 | 20 994 | 21 450 | |
| oil (Tracy) | 0 | 625 | 0 | 625 | 0 | 625 | 0 | 625 | 0 | 625 | 0 | |
| nuclear (Gentilly 2) | 0 | 0 | 0 | 0 | 0 | 0 | 423 | 423 | 423 | 423 | 423 | |
| gas turbines | 0 | 404 | 0 | 404 | 0 | 404 | 0 | 404 | 0 | 404 | 0 | |
| diesels | 42 | 52 | 49 | 60 | 56 | 69 | 65 | 80 | 73 | 90 | 82 | |
| Total | 13 107 | 14 390 | 14 779 | 16 396 | 16 835 | 18 313 | 18 611 | 20 283 | 20 660 | 22 536 | 21 955 | |
| firm purchases | 4 614 | 4 666 | 4 414 | 4 322 | 4 170 | 4 172 | 4 170 | 4 172 | 4 170 | 4 172 | 4 170 | |
| Total Capacity (1) | 17 721 | 19 056 | 19 193 | 20 718 | 21 005 | 22 485 | 22 781 | 24 455 | 24 830 | 26 708 | 26 125 | |
| <u>DEMAND</u> | | | | | | | | | | | | |
| firm demand (2) | 15 902 | 19 680 | 16 269 | 21 151 | 16 991 | 22 318 | 18 029 | 23 967 | 19 144 | 25 734 | 20 341 | |
| required reserve | 1 426 | 0 | 1 591 | 742 | 1 768 | 1 190 | 1 962 | 1 148 | 2 178 | 1 694 | 2 416 | |
| Total required | 17 328 | 19 680 | 17 860 | 21 893 | 18 759 | 23 508 | 19 991 | 25 115 | 21 322 | 27 428 | 22 757 | |
| Surplus (deficit) | 393 | (624) | 1 333 | (1 175) | 2 246 | (1 023) | 2 790 | (660) | 3 508 | (720) | 3 368 | |
| Interruptible Demand | 0 | 480 | 0 | 540 | 0 | 600 | 0 | 660 | 0 | 720 | 0 | |
| Residual Deficit | - | 144 | - | 635 | - | 423 | - | 0 | - | 0 | - | |

(1) Before allowing for maintenance.

(2) Includes 800 MW firm exports to PASNY during the month of October.

HYDRO - QUEBEC

ENERGY

Capability, Load and Surplus (gigawatt hours)

| | <u>1980</u> | <u>1981</u> | <u>1982</u> | <u>1983</u> | <u>1984</u> | <u>1985</u> |
|----------------------|----------------|----------------|----------------|----------------|----------------|----------------|
| <u>Capability</u> | | | | | | |
| hydro (1) | 81 296 | 86 671 | 95 290 | 103 779 | 112 727 | 122 298 |
| oil (Tracy) | 100 | 100 | 100 | 100 | 100 | 100 |
| nuclear (Gentilly 2) | 0 | 0 | 0 | 2 724 | 2 724 | 2 724 |
| gas turbines | 0 | 0 | 0 | 0 | 0 | 0 |
| diesels | 200 | 229 | 256 | 293 | 333 | 375 |
| Total | <u>81 596</u> | <u>87 000</u> | <u>95 646</u> | <u>106 896</u> | <u>115 884</u> | <u>125 497</u> |
| firm purchases | <u>32 148</u> | <u>31 609</u> | <u>29 733</u> | <u>29 733</u> | <u>29 733</u> | <u>29 733</u> |
| Total Capability | 113 744 | 118 609 | 125 379 | 136 629 | 145 617 | 155 230 |
| Firm Load (2) | <u>107 943</u> | <u>115 361</u> | <u>118 172</u> | <u>125 432</u> | <u>134 438</u> | <u>144 041</u> |
| Surplus | 5 801 | 3 248 | 7 207 | 11 197 | 11 179 | 11 189 |

(1) Based on average stream flows and normal operating conditions. Takes into account the inter-seasonal and multi-annual regulation characteristics of the reservoirs.

(2) Includes 3000 GW.h firm exports to PASNY during the months of April through October in 1980 and 1981.

TERMS AND CONDITIONS OF LICENCE FOR THE EXPORT OF FIRM POWER
AND ENERGY TO CITIZENS UTILITIES COMPANY

1. The term of this licence shall commence on the 1st day of January 1981 and shall end on the 31st day of December 1985
2. The class of inter-utility export transfer authorized hereunder is a sale transfer of firm power and energy.
3. The Licensee shall not export power or energy hereunder except during the period commencing with the 1st day of April and ending with 31st day of October in each year throughout the term of this licence.
4. The power to be exported hereunder shall be transmitted over the 120 kV international power line for which the Board has issued Certificate of Public Convenience and Necessity No. EC-III-17 and such other international power lines as the Board may authorize from time to time.
5. The power to be exported hereunder shall be the "Firm Electrical Power and Energy", described in the Power and Energy Agreement between Citizens Utilities Company and the Licensee, dated the 26th day of June 1980, hereinafter referred to as the "Agreement".
6. All exports made hereunder shall be in accordance with the said Agreement.
7. The quantity of power that may be exported hereunder shall not exceed
 - (a) 32 megawatts in the calendar year 1981,
 - (b) 37 megawatts in the calendar year 1982,

- (c) 39 megawatts in the calendar year 1983,
 - (d) 42 megawatts in the calendar year 1984, and
 - (e) 46 megawatts in the calendar year 1985.
8. As a tolerance, the Licensee may export power at a rate momentarily in excess of that set forth in Condition 7 hereof if such an excess is caused by
- (a) electrical short circuit or other uncontrollable circumstances,
 - or
 - (b) inability to control precisely the actual rate of transfer.
9. The quantity of energy that may be exported hereunder shall not exceed
- (a) 131.4 gigawatt hours in the calendar year 1981,
 - (b) 152.0 gigawatt hours in the calendar year 1982,
 - (c) 160.2 gigawatt hours in the calendar year 1983,
 - (d) 172.5 gigawatt hours in the calendar year 1984, and
 - (e) 189.0 gigawatt hours in the calendar year 1985.
10. For each year after 1982, the price for firm electrical power established under Article 7.1.1 of the Agreement shall be subject to the approval of the Board before any export is commenced in that year.
11. The Licensee shall not, without the prior approval of the Board, amend, enter into any agreement in substitution for or in addition to, or terminate, the Agreement referred to in Condition 5 hereof.

12. The Licensee shall not cause its thermal generation to be operated, nor shall it purchase power or energy, for the purposes of making exports hereunder.
13. The Licensee, within 15 days after the end of each month during the period commencing on the 1st day of April and ending with the 31st day of October in each year throughout the term of this licence, shall file with the Board a report in such form and detail as the Board may specify, setting forth for each such month
 - (a) the quantities of power and energy exported hereunder,
and
 - (b) the price and resulting revenue.

TERMS AND CONDITIONS OF LICENCE FOR THE EXPORT OF
INTERRUPTIBLE POWER AND ENERGY TO VERMONT PUBLIC SERVICE BOARD

1. The term of this licence shall commence on the 1st day of October 1980 and shall end on the 30th day of September 1985.
2. The class of inter-utility export transfer authorized hereunder is a sale transfer of interruptible power and energy.
3. The power to be exported hereunder shall be transmitted over the 765 kV international power line for which the Board has issued Certificate of Public Convenience and Necessity No. EC-III-15.
4. The quantity of power that may be exported hereunder shall not exceed 52 megawatts.
5. The quantity of energy that may be exported hereunder during any 12-month period commencing on the 1st day of October and ending on the 30th day of the following September, hereinafter referred to as the "Contract year", shall not exceed 320 gigawatt hours.
6. The power to be exported hereunder shall be as described in the Power and Energy Contract between Vermont Public Service Board and the Licensee dated the 26th day of June 1979, hereinafter referred to as the "Contract".
7. The Licensee shall not export power hereunder unless it is surplus to the firm requirements of economically accessible Canadian markets at the time it is exported.

8. The Licensee shall interrupt or curtail the delivery of power hereunder whenever and to whatever extent such power is required to supply
 - (a) any firm load within Canada, or
 - (b) any Canadian electrical utility willing to buy part or all of the power at the same price as that of the export, adjusted for possible differences in the cost of delivery.
9. For each contract year after that ending in 1981, the price for electrical power established under Section 7.1 of the Contract shall be subject to the approval of the Board before any export is commenced in that contract year.
10. During the term of this licence for each six-month period after that ending on the 31st day of March 1981, the price for energy established under Section 7.1 of the Contract shall be subject to the approval of the Board before any export is commenced in that six-month period.
11. The Licensee shall not, without the prior approval of the Board, amend, enter into any agreement in substitution for or in addition to, or terminate, the Contract referred to in Condition 6 hereof.

12. The Licensee shall not cause its thermal generation to be operated, nor shall it purchase power or energy, for the purposes of making exports hereunder.
13. The Licensee, within 15 days after the end of each month comprised in the term of this licence, shall file with the Board a report in such form and detail as the Board may specify, setting forth for that month
 - (a) the quantities of power and energy exported hereunder,
and
 - (b) the price and resulting revenue.

TERMS AND CONDITIONS OF LICENCE FOR THE EXPORT
OF INTERRUPTIBLE ENERGY TO CITIZENS UTILITIES COMPANY

1. The term of this Licence shall commence on the 1st day of January 1981 and shall end on the 30th day of September 1985.
2. The class of inter-utility export transfer authorized hereunder is a sale transfer of interruptible energy.
3. The energy to be exported hereunder shall be transmitted over the 120 kV international power line for which the Board has issued Certificate of Public Convenience and Necessity No. EC-III-17 and such other international power lines as the Board may authorize from time to time.
4. The maximum rate at which energy may be exported hereunder shall not exceed 80 megawatts, less actual exports under the licence to be issued pursuant to Appendix 5 of this report.
5. The quantity of energy that may be exported hereunder during any calendar year shall not exceed
 - (a) 525 gigawatt hours in 1981, 1982, 1983 and 1984, or
 - (b) 400 gigawatt hours in 1985,less actual exports under the licence to be issued pursuant to Appendix 5 of this report.
6. The energy to be exported hereunder shall be the "Assured Secondary Energy" described in the Power and Energy Agreement dated the 26th day of June 1980 between Citizens Utilities Company and the Licensee, hereinafter referred to as the "Agreement".
7. The Licensee shall not export energy hereunder unless it is surplus to the firm energy requirements of economically accessible Canadian markets at the time it is exported.

8. The Licensee shall interrupt or curtail the delivery of energy hereunder whenever and to whatever extent such energy is required to supply
 - (a) any firm load within Canada, or
 - (b) any Canadian electrical utility willing to buy part or all of the energy at the same price as that of the export, adjusted for possible differences in the cost of delivery.
9. The price for energy exported hereunder shall be not less than the then current combined price for exports of hydraulic power and energy to Vermont Public Service Board under the licence to be issued pursuant to Appendix 6 of this report.
10. The Licensee shall not, without the prior approval of the Board, amend, enter into any agreement in substitution for or in addition to, or terminate, the agreement referred to in Condition 6 hereof.
11. The Licensee shall not cause its thermal generation to be operated, nor shall it purchase power or energy, for the purposes of making exports hereunder.
12. The Licensee, within 15 days after the end of each month comprised in the term of this Licence, shall file with the Board a report in such form and detail as the Board may specify, setting forth for that month
 - (a) the quantities of power and energy exported hereunder, and
 - (b) the price and resulting revenue.

